To alleviate some issues inherent with the Kinect, a rotating mount was built to allow the Kinect to pan and face its target. The Kinect has a limited field of view that is problematic when it is being used from a mobile base, and the pan mount greatly helps to expand the effective field of view. The Kinect is most adept at tracking targets with low relative motion, so the pan mount helps by lowering relative motion low between the Kinect and the target.

The ServoCity DDP155 Base Pan was selected for the mounting hardware. The DP155 is a low-cost, direct-drive pan mount that encorporates a standard servo.[INSERT PICTURE] The DP155 has a ball-bering shaft that makes the pan head extremely rigid, reducing axial stresses on the servo. The GET NAME hobby servo was selected.

To drive the servo, the 1066\_0 PhidgetAdvancedServo 1-Motor was selected. The Phidgets 1066\_0 allows precise open-loop control of a hobby servo at 30 Hz, obeying constraints on velocity and acceleration. Phidgets also provides a convenient C API to command rotation angles and change options. The device is completely powered by a USB port and provides real-time feedback on current consumption as well as open-loop feedback on position and velocity.

The pan mount was placed near Harlie’s center [INSERT DIAGRAM] to get the widest field of view. It was determined that the Kinect’s vertical field of view was sufficient, so tilt capability for the mount was ruled unnecessary, cutting down on complexity and cost.

The TF (transform) API of ROS was used to take care of the time-varying transform between the Kinect and the rest of the robot. A node subscribes to a position from the person tracker, transforms it to coordinates relative to Harlie's base frame, and publishes a target angle. The head controller subscribes to this angle and communicates with the Phidget 1066\_0 and publishes a transform incorporating the open-loop feedback. [INSERT FIGURE]

The performance of the pan mount was tested. A subject stood 1.5m away from the Harlie, while the Kinect's RGB data was fed into a Viola-Jones face detector at 2Hz. The face detector detected the subjects face in Kinect-relative coordinates, which were transformed to world coordinates to account for the motion of the pan mount. If the pan mount and its associated transformations were working perfectly, the detected face would always be detected in the same world-relative position, no matter the position or velocity of the pan mount.

The pan mount was repeatedly rotated through its field of view, and the output of the face detector was

The pan mount was repeatedly rotated through its field of view, and the output of the face detector was transformed to world coordinates. Figure [INSERT FIGURE]

and the detected face was transformed from Kinect-relative coordinates to world coordinates. As the pan mount rotated from side to side, if the pan mount and its transforms were performing perfectly, the detected face should remain the same in world coordinates.. As the pan mount was moved from side to side, the output of the face detector was transformed into world coordinates.

If the pan head worked perfectly, the face would be detected in the same spot no matter the position or velocity of the pan head. [GET DATA AND INSERT FIGURE]

There is some lag. If the pan mount is still, performance is better. This could be either due to

Because the objective of this project was to track people, great precision was not required. Because the object is to track people, the Kinect can tolerate around a foot of error for its measurements. In the future, more precise calibration could be performed to allow the Kinect to be used for mapping.

Although the pan mount greatly improves the tracking capabilities of the Kinect from a mobile base, the Kinect is still sensitive to bumps and vibrations. In the future, a vibration-isolating mount could be explored.